

**REMARKS**

**Status of Claims**

Claims 1-32 are pending, of which claim 1 is an active independent claim. Favorable reconsideration of the application in light of the following comments is respectfully solicited.

**Claim Rejection – 35 U.S.C. § 103**

Claims 1-32 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Fukaya et al. (JP 2001-353603) in view of Hirano et al. (USP 6,066,399), in view of Sheeja et al.

(“Tribological properties and adhesive strength of DLC coatings prepared under different substrate bias voltages”), as evidenced by Ohring (“Materials Science of Thin Films, Deposition and Structure”). This rejection is traversed for at least the following reasons.

Applicants respectfully submit that the Examiner’s reliance on Hirano is inappropriate because Hirano is directed to a hard carbon thin film including a carbon-carbon bond, but fails to disclose the coated film formed from “*a carbide, a nitride, an oxide, a carbonitride, an oxycarbide, an oxynitride, or a carbide-nitride-oxide of at least one element selected from IVa-group elements, Va-group elements, VIa-group elements in the element periodic table, Al, B, Si and Ge, or a solid solution thereof,*” as recited by amended claim 1. Applicants respectfully submit that it is well known that the concept of the  $sp^2/sp^3$  ratio is specific to the carbon-carbon bonding, which is also evidenced by Hirano’s disclosure at col. 2, lines 42-52. This portion states:

The  $sp^2$  and  $sp^3$  carbon-carbon bondings indicate different forms of chemical bonding between carbon atoms. It is generally known that the carbon-carbon bonding in the diamond thin film is predominantly  $sp^3$  while that in a graphite is predominantly  $sp^2$ . It is also known that an amorphous diamond-like carbon thin film, as well as a partially crystalline diamond-like carbon thin film, may have a structure in which both  $sp^2$  and  $sp^3$  carbon-carbon bondings are distributed

therethrough. In the present invention, such a  $sp^2/sp^3$  ratio is characteristically varied in a film thickness direction as described earlier.

Therefore, the concept of the  $sp^2/sp^3$  ratio in Hirano would not have been combined with the coated film of *a carbide, a nitride, an oxide, a carbonitride, an oxycarbide, an oxynitride, or a carbide-nitride-oxide of at least one element selected from IVa-group elements, Va-group elements, VIa-group elements in the element periodic table, Al, B, Si and Ge, or a solid solution thereof*, which do not contain the carbon-carbon bonding. As such, there is no motivation or suggestion to combine Hirano with Fukaya to arrive at the present subject matter.

Further, Hirano changes the chemical composition to vary the  $sp^2/sp^3$  ratio. In contrast, the variation in strength of compressive stress in Fukaya does not involve changing of the chemical composition or bonding structure between atoms. Fukaya discloses that the stress distribution is attained only in one layer having a single chemical composition. Therefore, a person skilled in the art would not combine the coated film in Fukaya, which does not employ changing of a chemical composition or bonding structure between atoms with the film in Hirano, which employs changing of a chemical composition or bonding structure between atoms.

Based on the foregoing, Applicants respectfully submit that claim 1 and all claims dependent thereon are patentable over the cited references.

Regarding claims 23-25, Applicants submit that Hirano does not disclose the subject matter of these claims. The Examiner asserts that stepwise increase/decrease of the stress, as shown in FIG. 15 of Hirano, discloses the subject matter of claims 23-25. However, the Example 5 of Hirano, which includes FIGS. 7 and 15-17, discloses a hard carbon film having a graded structure in which the  $sp^2/sp^3$  ratio (i.e., stress) once decreases in a stepwise manner and then increases in a stepwise manner (see, col. 13, lines 42-49 of Hirano). It is very likely that the  $sp^2/sp^3$  ratio distribution is similar to FIG. 6 of Hirano. As such, it is clear that Hirano fails to

disclose the stress distribution as defined by claims 23-25. Thus, claims 23-25 are patentable over the cited references on their own merit in addition to the dependency upon claim 1.

Thus, it is requested that the Examiner withdraw the rejection of claims 1-32 under 35 U.S.C. § 103(a).

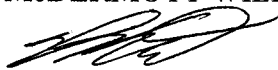
**Conclusion**

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication for which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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